

ORIGINAL

PRE-FILED TESTIMONY  
OF RICHARD CONRAD, Ph.D  
MPUC Docket No. 2011-00262



0000145970

1 Q. Please state your name, address, contact information and occupation.

2  
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Arizona Corporation Commission

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9 Biochemist, Inventor and Consultant

10 Q. What is your scientific background: your training and degrees?

11 A. I have a Ph.D. in Biochemistry from Johns Hopkins University and did postdoctoral  
12 research at the Institute of Molecular Biophysics of Florida State University and in the  
13 Department of Biochemistry of Cornell University. Please see my curriculum vitae  
14 attached as Exhibit A for further details.

15 Q. Have you studied the phenomenon of Electrical Sensitivity associated with exposure  
16 to radio frequency radiation?

17 A. Yes, in great depth. I have a great deal of experience with Electrical Sensitivity/ES/EHS  
18 from having it myself, from having consulted with hundreds of people suffering from it,  
19 and by reading the scientific literature on non-thermal effects of RF/EMF and on  
20 Electrical Sensitivity. I recently conducted a survey of people who have experienced  
21 electrical sensitivity related to smart meters (Smart Meter Health Effects Survey).

22 Q. What is your expertise pertinent to Electrical Sensitivity and to the Smart Meter  
23 Health Effects Survey?

24 A. I am highly qualified for designing and analyzing the "SMART METER HEALTH  
25 EFFECTS SURVEY" because I am in the unique position of:

26 1. being an expert in hands-on experimental research design, analysis and reporting;

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- 1 2. having an in-depth academic training and knowledge of biochemistry, biophysics,  
2 spectroscopy and biocompatibility;
- 3 3. having an extensive knowledge and love of electronics, having designed and built  
4 dozens of different types of electronic devices, and was an amateur radio operator;
- 5 4. being a paid consultant having talked to and helped hundreds of persons with ES/EHS  
6 (Electrical Sensitivity/Electrical HyperSensitivity) and MCS (Multiple Chemical  
7 Sensitivity) issues over the past ten years;
- 8 5. being electrically sensitive myself for 15 years, therefore knowing EHS from the inside  
9 out;
- 10 6. having consulted with two experts in survey design, spent many hours reading survey  
11 design information, many hours on the phone with experienced SurveyGizmo tech  
12 support people, and having carefully read and followed the guidelines in the NIH Course:  
13 "Protecting Human Research Participants" (NIH Office of Extramural Research).

14 **Q. What are your own experiences with Electrical HyperSensitivity/EHS?**

15 **A.** I became electrically sensitive 15 years ago. I offer a complete account of my own  
16 experiences in the attached Exhibit B, which I incorporate into my testimony by  
17 reference.

18 **Q. What are your conclusions about the current state of the science on EHS and the**  
19 **effects of RF on humans?**

20 **A.** Based on my review of the science, it is my opinion that there are many common  
21 misconceptions about effects of EMF and about EHS (Electrical Hypersensitivity). The  
22 criticism that there are no plausible mechanisms for biological effects from low levels of  
23 RF exposure is totally invalid. I briefly summarize these points below, and provide a

1 more comprehensive expert opinion statement attached as Exhibit C, which I incorporate  
2 into my testimony by reference.

3 A first serious misconception: *"if EMF levels are not high enough to cause bulk heating*  
4 *of tissue, then there cannot possibly be any effect."*

5 A second serious misconception: *"if the average power level is below a certain safe*  
6 *standard, then a device is safe, and it does not matter whether the RF is continuous or*  
7 *pulsed"*.

8 A third serious misconception: *"Electrical sensitivities are not real because people only*  
9 *imagine that they are sensitive to EMF; they took on these sensitivities out of paranoia*  
10 *after having heard about them from others; the placebo effect."*

11 There are innumerable possible mechanisms, but in research, to insist on being able to  
12 conceive of mechanism before accepting good reproducible data is a clear sign of  
13 scientific incompetence.

14 **Q. Describe your consulting services and what you have learned from speaking with**  
15 **your clients.**

16 **A. Every week I get calls from new people (who find me via my website**  
17 **[www.conradbiologic.com](http://www.conradbiologic.com)) who say they have recently become electrically sensitive;**  
18 **especially lately, with the installation of so many smart meters. They call me for**  
19 **consulting help to reduce their electrical exposures from their computer and other devices**  
20 **in their office or home. I first question them in great detail, because I don't want to waste**  
21 **my time chasing psychological stuff. What I have found is:**

22 **1. There are a few (very few) persons I have talked to who, due to a high level of**  
23 **suggestibility and fear, thought they were sensitive to EMF and were obviously not (the**

1       nocebo effect). I have also talked to two persons who sounded psychotic and believed  
2       without basis that they had ES.

3       2. Then there are some who become truly sensitive to some sources of RF and later  
4       become fearful that they are also sensitive to some other sources that they are not really  
5       sensitive to, due to a layer of "understandable" paranoia generated by really having  
6       suffered so much from something they could not see, hear, smell or touch. Especially  
7       those that tend to get emotional about it.

8       3. Some persons with true electrical sensitivities are additionally a bit neurotic or wacky,  
9       just like a lot of persons in the general population are.

10      4. In many persons with true electrical sensitivities, EMF exposures known or unknown  
11      can have an effect on the physiological functioning of the mind and hormones, causing  
12      ADD, migraines, neurologically induced stress or depression, etc.

13      5. Because of the severe limitations placed on their lifestyle by their very real (although  
14      usually invisible) disability, psychological stress and/or depression can understandably  
15      result on top of all this.

16      6. There are many people who are astute, completely level-headed and sane, like the  
17      numerous scientists, engineers, programmers, financial advisors and realtors I have talked  
18      to, who love their work and their computers but are truly disabled because they can't sit in  
19      front of a computer for more than a few minutes without having debilitating symptoms  
20      and so can't work anymore, they can only drive an older car with the early, less powerful  
21      computer under the hood (like my own 1990 Toyota Corolla), can't travel into many  
22      environments, their partners and friends leave them because they are not willing to  
23      believe or accommodate them, etc. It goes on and on, and gets worse and worse, and  
24      worse. EHS is very real.

EHS is similar to the situation with food allergies: a person who is allergic to a particular food will react to it whether or not they know it is a hidden ingredient in a mixture, a soup, for example. And most would not choose, either consciously or subconsciously, to be restricted in their choice of foods, or to feel worse after eating instead of better. It just happens. And people who have never experienced food allergies themselves often disregard it - they may accept the concept intellectually and yet at the same time not believe it at the emotional level (beliefs, and humans in general, are more emotional than rational). It would not be difficult for one person without food allergies to convince another who had never experienced allergies, that food allergies do not really exist in anyone. By analogy, this is likewise true in the case of EMF sensitivities.

Another analogy between EHS and food allergies: most people with EHS are much more sensitive to certain frequencies than to other frequencies. You won't get a positive result by challenging a person with wheat if they are allergic to dairy only. Thus if you are doing an experiment to test for the reality of EHS, you have to test the person to frequencies he or she is sensitive to. In such testing there are many variables, some of which are uncontrollable or unknown. Variables that must be controlled or taken into account include: recent exposures, current background exposures, current state of homeostasis/health/circadian rhythms of the person (or of the animal in animal studies, or of the cell culture in the case of in vitro studies). The above analogies also hold true for chemical exposures in persons with Multiple Chemical Sensitivities.

**Q. What further evidence do you have that EHS is real?**

**A. The "anecdotal" evidence from day-to-day life supplied by persons who themselves have EHS (who are the real experts in this field), is very strong. It actually has all the elements of good science:**

1 1. Totally blinded experiments with internal controls (at first, subjects were usually naive,  
2 and later, many exposures were inadvertent and only discovered after the fact).

3 2. Careful observation (pain is hard to miss, and is well-remembered).

4 3. Consistency and specificity; experimental results reproduced with similar results,  
5 dozens or hundreds of times:

6 A) in each sensitive individual (EMF exposure resulting in symptoms, then more  
7 EMF exposures resulting in similar symptoms, usually many times per month);

8 amplified by nearly identical experiences in the form of inadvertent experiments by:

9 B) each of hundreds of thousands of sensitive persons who at first had never heard of  
10 EHS from anyone, each person having the same results.

11 4. Repeated, strong and direct correlation between specific cause and specific effect.

12 closely related in time: EMF exposure repeatedly and rapidly resulting in uncomfortable,  
13 painful symptoms. This clearly shows that the smoking gun is EMF exposure.

14 Q. Please give a summary of the most common symptoms of EHS.

15 A. The symptoms fall into a typical group. Many of these seem to be generated by  
16 neurological changes and/or inflammation and include heart palpitations or arrhythmia,  
17 burning skin, tinnitus/microwave hearing, unusual headaches and insomnia. The  
18 symptoms are often diffuse, and should be expected to be so because they appear to  
19 involve systems of the body that are completely diffused throughout the body: the  
20 biochemistry of the cells, and the nervous system, endocrine system and immune system.

21 Q. How did the Smart Meter Health Effects Survey come about?

22 A. As of six months ago I had never heard of smart meters. Then over the course of a few  
23 weeks I began receiving calls to consult for newly electrically sensitive people who asked  
24 me to advise them how to modify their computer set-up so they could tolerate using it.

1 Many of them said they had never heard of electrical sensitivities before, were  
2 developing strange symptoms they never had before, could not use computers, wi-fi or  
3 cell phones any more without painful symptoms (even though previously they had been  
4 using them heavily with wi-fi in offices and on in homes 24/7). Weeks or months after  
5 their symptoms began they first discovered a smart meter on their home. Upon inquiry,  
6 they found out it had been installed at the time or just before their symptoms initiated.  
7 Many of them had not even known or cared what a smart meter was before this. But  
8 then, intelligently (not fearfully) they began to make correlations: when they got closer to  
9 the smart meter, their symptoms got worse, and when they went further away, their  
10 symptoms lessened. All this was surprising to me because this device was initiating ES  
11 in previously normal, healthy persons who had tolerated wi-fi and cell phones for years  
12 with no problems.

13 Then I began reading the testimonies of others whose electrical sensitivities had been  
14 initiated, or in cases where the person already had ES, worsened considerably, by  
15 exposure to smart meters. Curious, I started to study the characteristics of smart meters,  
16 and even spoke to Ric Tell, the electronic engineer expert who has made measurements  
17 on smart meters for industry, to try to understand why these relatively low-power  
18 microwave transmitters could have such an effect. There are a number of possible  
19 reasons, which I will discuss later, but at this point the answer is unknown. In spite of  
20 not understanding how and why, it began to appear to me that the smart meters might  
21 really be unsafe for at least some people, in the short-term. What struck me most was the  
22 common time-line: normal people, strange new symptoms, and only later discovered that  
23 a smart meter had been installed. This is not mere anecdotal evidence, but is equivalent  
24 to double-blind experiments, and it was being reproduced many times by many naive

1 persons. But in their testimonials not everyone gave all the facts to enable a careful and  
2 objective analysis, and teasing the data out of many testimonials all written in different  
3 styles would have been a daunting task.

4 I saw these people were really suffering with what appeared to be a common array of  
5 diffuse neurological and other symptoms, that it seemed to be due not to fear or  
6 psychological factors, but to the smart meters and it was destroying their lives. So I  
7 wanted to help, and since no one else was collecting the data to try to discover what was  
8 really going on as far as health issues in the short-term, the survey began to take shape in  
9 my mind.

10 **Q. What is the purpose of the Smart Meter Health Effects Survey?**

11 A. The purpose was to develop reliable data much more solid than ordinary anecdotal  
12 evidence, about possible smart meter health effects, and their time-line (development of  
13 symptoms in relation to installation of smart meter in relation to knowledge of meter's  
14 presence). My purpose was to obtain a database for analysis to see whether or not smart  
15 meters are really the cause of people's reported symptoms - letting the data speak for  
16 themselves - to see if smart meters are unsafe as far as health is concerned. Two of the key  
17 questions I want to answer are:

- 18 1) do smart meters initiate electrical sensitivities in previously normal persons, and  
19 2) do smart meters worsen the electrical sensitivities in persons who were already  
20 electrically sensitive?

21 **Q. Is this survey a prevalence survey?**

22 A. Definitely not. That is not its purpose at all. We did not survey the general population,  
23 but only solicited responses from persons who already felt that they had experienced  
24 health effects/symptoms from exposure to smart meters. We have made no attempt to



1 collect data on prevalence of health effects from smart meters in the overall population.

2 We only wish to establish whether or not smart meters are actually the cause of health  
3 effects in the persons who feel that they have already made such a correlation.

4 **Q. Was not a previous smart meter survey and its summary report distributed in 2011?**

5 **A. A "Wireless Utility Meter Safety Impacts Survey" was conducted in 2011 by the EMF**  
6 **Safety Network, and its report is available on-line. It did collect much useful**  
7 **information, including on specific symptoms, but its main emphasis was not on health**  
8 **effects. It did not ask detailed enough questions to establish a time-line, nor did it ask**  
9 **whether people were initially normal without sensitivities, or had ES before their smart**  
10 **meter. My Smart Meter Health Effects Survey is specifically about health effects and**  
11 **asks many more detailed health effects questions.**

12 **Q. What safeguards does the survey incorporate to recognize mistakes or to prevent**  
13 **bogus answers?**

14 **A. A number of the most critical questions are asked in a few different ways, and on**  
15 **different pages of the survey, in order to provide a cross-check against possible mistakes**  
16 **and bogus answers. (It is a forward only survey, which means that the respondent cannot**  
17 **go back to see how they answered a previous version of a similar question, nor can they**  
18 **change an answer on a previous page). In the approximately 20 cases I found where**  
19 **answers conflicted, I called and spoke to the respondent and carefully asked them the**  
20 **question(s) again in a way so as to avoid biasing their answer, and edited the survey**  
21 **accordingly, with their permission. All except about 10 respondents had supplied first**  
22 **name, last name and mailing address (in most cases a street address) and most also gave a**  
23 **phone number and/or email. In the 3 cases where the person was not reachable, I**

1 converted an impossible answer to n/a. About 5 surveys were clearly bogus, and I  
2 excluded these.

3 I carried out a search to find all cases where more than one survey had come from the  
4 same IP address. I found five instances, and checked all of them out carefully: one was a  
5 mother and adult daughter both affected by smart meters, one was housemates both  
6 affected, two were husband and wife both affected, and one was a woman who had taken  
7 the survey twice because she had changed her mind about some answers. When I emailed  
8 the latter, she could not confirm that her symptoms were from smart meters, so I  
9 excluded both of her surveys.

10 **Q. What are the conclusions of the Smart Meter Health Effects Survey?**

11 **A.** A copy of my report with a summary of survey results is attached as Exhibit D.<sup>1</sup> The  
12 survey results provide very strong evidence that smart meters are causing painful and  
13 debilitating new symptoms in many previously normal healthy people, and causing them  
14 to become electrically sensitive to a whole range of electronic devices including Wi-Fi,  
15 cell phones and computers. Because of exposure to smart meters, people are becoming  
16 electrically sensitive at an unprecedented rate. Many of these people had previously lived  
17 with Wi-Fi in their homes on 24/7, worked in offices with Wi-Fi and many computers all  
18 day long, and had used a cell phone, all without symptoms. This includes professionals  
19 from all walks of life: doctors, dentists, nurses, teachers, realtors, salesmen, and many  
20 who absolutely needed their computers for their work and had loved their electronic  
21 devices: computer programmers, electronic engineers, accountants and graphic artists.

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<sup>1</sup> The complete set of survey data is available upon request. Because the production of this report was rushed to meet the testimony deadline in large part because of technical difficulties at Survey Gizmo, further compilations and summaries of the survey data may be produced with supplemental testimony.

1 Q. What are some common effects on people of the symptoms reported in the Survey,  
2 and when do these symptoms appear and disappear?

3 A. The symptoms caused by smart meters are often disabling, and are sometimes painful to  
4 the degree of torture. Since smart meters and the cell phone towers that smart meters  
5 have sensitized people to are almost everywhere now, these people have no place to go to  
6 escape. They are trapped (unless they can afford to buy a huge ranch). They are trapped  
7 in a hellish situation, not one of their own making. This Survey has demonstrated that the  
8 personal evidence is equivalent to hundreds of double-blind experiments, and is not  
9 psychosomatic or mass hysteria. These unfortunate people bear none of the  
10 responsibility. The responsibility falls solely on new technology - particularly smart  
11 meters, and the people who implemented them without any biological conscience,  
12 without conducting a human impact study (while distributing a large amount of  
13 propaganda in an attempt to proactively counter the thousands of research papers that  
14 demonstrate biological effects of non-thermal levels of microwave radiation). Would  
15 hundreds or thousands (or millions worldwide) of initially naive persons, many of them  
16 astute, independently choose such a disability because of some form of mass hysteria?  
17 This is an illogical conclusion due to either a lack of intelligence, being misinformed, or  
18 having vested interests combined with lack of ethics. Therefore people with EHS, the  
19 real experts, whose vested interests are biological - human health, human rights and  
20 biocompatibility - are those who should be listened to, rather than engineers and  
21 businessmen with technological and financial vested interests.

22 It is extremely important to note that in 42% of the survey respondents, the  
23 symptoms and sensitization began before, (often months before) they knew that there was  
24 a smart meter present. Many of these persons had never heard of electrical sensitivities

1 before their symptoms began, and some had never heard of a smart meter. Thus this  
2 evidence is not merely anecdotal evidence, but is good scientific evidence, obtained in  
3 double-blind experiments reproduced in many, many people. These smart meter effects  
4 cannot possibly be psychosomatic, in spite of publications that claim otherwise.

5 **Q. Please describe the Survey results in more detail.**

6 **A.** Setting aside all prior research results and papers good and bad, biased or not,  
7 preconceptions, debates about mechanisms and non-thermal effects, calculations right  
8 and wrong, theories, microwave power levels seemingly too low to have any effects,  
9 vested interests, fears of EMF or of cancer risk or other possible long-term health effects;  
10 the survey results show that in:  
11 1. 210 survey respondents,  
12 2. the majority well-educated (9 PhDs, 1 MD, 1 DDS, 42 MS or MA, 70 BS or BA),  
13 3. many initially healthy and normal, without sensitivities, using WiFi, computers and  
14 cell phones without symptoms,  
15 4. many had no prior knowledge of electrical sensitivities and had not cared one way or  
16 another about smart meters,  
17 5. all began to develop painful symptoms very typical of electrical sensitivities  
18 (including loud tinnitus, heart palpitations or arrhythmias, burning skin, severe headaches,  
19 neuropathies, difficulty concentrating, sleep problems and more) soon after their smart  
20 meters were installed,  
21 6. where 42% of them were not even aware that a smart meter had been installed on their  
22 home until after they developed symptoms (a double-blind "experiment"), and 16% did  
23 not develop symptoms until weeks or months later (if they were going to have

1 psychosomatic symptoms, these would have developed in minutes, hours or days, not  
2 weeks or months), and

3 7. when they were able to have the smart meters removed, their symptoms lessened  
4 usually immediately, sometimes completely, and usually leaving them with electrical  
5 sensitivities where they no longer can use their electronic office equipment at all, or only  
6 for very short periods of time.

7 To any logical mind, the above 7 points, when viewed together constitute solid scientific  
8 evidence. Evidence that indicates there is something as yet undiscovered about smart  
9 meters that is causing them to sensitize people to EMF - to develop Electromagnetic  
10 HyperSensitivities (EHS). This is a real, seriously disabling and growing problem that  
11 will not go away by itself. It is not psychological in spite of understandably sometimes  
12 having emotional or psychological overlays, but these are only layers on top of very real  
13 physical, physically caused symptoms. Many of these persons have had to leave their  
14 homes and careers. Sometimes everyone in the family develops symptoms.

15 In some cases the problems were due to banks of 30 to 60 smart meters within 10  
16 feet of their apartments or beds, but in many cases people have been affected only by  
17 their own single meter on a private home in a residential district with spaced-apart  
18 houses.

19 I am writing here about real people and real suffering. Presently more and more  
20 people are developing EHS worldwide at an alarming and unprecedented rate (O//  
21 Hallberg & G. Oberfield, Electromagnetic Biology and Medicine, 25: 189-191, 2006,  
22 attached as Exhibit E). The total number is already huge - we shouldn't have to wait until  
23 the numbers grow even larger to get help - the number of people already affected is  
24 enough to require doing something about it. These people will have no place left to go,

1 and no careers. Smart meters are an experiment carried out by utilities and others mostly  
2 for their own profit, without prior safety testing, and it appears to be a classic example of  
3 technology creating far more problems than it solves, problems of all kinds that will  
4 persist and increase. It will be like swallowing an endless string. There will be no end to  
5 health problems, health costs and financial costs. Smart meters as they are today are  
6 extremely flawed - an overly complex system being propagated worldwide without any  
7 human impact study. There are far smarter ways to implement a smart grid. If a  
8 technology is not carefully and properly designed to serve human beings, then human  
9 beings end up being slaves to (and in this case, injured by) the technology.

10 Furthermore, EHS sensitization and the resulting outcry against smart meters does  
11 not originate as a coherent or mass phenomenon. It consists of many separate individual  
12 occurrences arising independently again and again in naive individuals, in countries all  
13 over the world. After they discovered that others also had similar symptoms following  
14 smart meter installation, people banded together to assert their rights. Here is an excerpt  
15 from an email I received recently from British Columbia, Canada: *"I am getting emails*  
16 *almost daily from people suffering health effects from being near these meters. Many*  
17 *have never heard of sensitivity, allowed the meters because they had no concerns, and*  
18 *are now suffering from tinnitus, disturbed sleep, headaches, palpitations – the classic*  
19 *symptoms of sensitivity."*

20 **Q. What is your opinion about why smart meters are making people electrically**  
21 **sensitive?**

22 **A.** There is something unique about the RF emissions of smart meters, in spite of their  
23 average power being very low, that makes them more sensitizing than Wi-Fi or cell  
24 phones. It is surprising that they are so sensitizing, but that is the reality. Electronic

1 engineers underestimate the sensitivity of biological systems, just as chemists did until  
 2 recently. We do not know why smart meters are so sensitizing. The manufacturers do not  
 3 reveal enough of the design and operational details for us to know, and some of what they  
 4 have revealed has turned out to be untrue. The measurements are hard to make on  
 5 networks in the field. The culprit may be the microwave pulses themselves radiated  
 6 through space to the person, or first propagated closer to the person via conduction on  
 7 house wiring and then radiated.

8 Some clues:

- 9 1. Many persons who managed to avoid having a smart meter on their own home were  
 10 affected by the neighbors' smart meters.
- 11 2. AMR meters were problematic, not just AML.
- 12 3. Smart meters whose transmitter was supposedly turned off were problematic.

13 We may be able to tease more information about these points later from the Survey data.

14 Questions that it would help to have answers to:

- 15 1. Are some brands of meters worse (more sensitizing, more painful) than others?
- 16 2. Which is worse: meters that use FHSS (Frequency-Hopping Spread Spectrum), or  
 17 those that use DSSS (Direct-Sequence Spread Spectrum) data transmission protocol?
- 18 3. Are the meters that are causing problems simply not within specs?
- 19 4. How much of the microwave pulses, and/or of the noise from the switching power  
 20 supply actually gets onto the power line/house wiring?
- 21 5. What is the peak amplitude of the pulses? Is it greater than the 1 or 2 watt rated  
 22 output of the transmitter, even though the average power and duty cycle are low?
- 23 6. Exactly what is the fine structure of each pulse (both of data pulses and of any other  
 24 mesh network pulses), and what is the frequency of the hopping, if any? In frequency

hopping, is there a time gap between hops, or does the signal look continuous within each overall data pulse? A frequency hopping transmission changes channels at regular intervals which are sometimes in the range of approximately 10 hops per second - this essentially constitutes 100% AM modulation at an important biological frequency - 10 Hz ([http://www.audiotel-support.com/site/appnotes/Spread Spectrum transmissions.pdf](http://www.audiotel-support.com/site/appnotes/Spread%20Spectrum%20transmissions.pdf)).

We need to see scope traces of smart meter outputs at various time bases, even slow traces, say 1 minute full screen, and also and particularly at 1 second full screen to look for the known biologically relevant frequencies of 2 thru 60 Hz.

People can take measures to avoid or filter polluted air or water, but they cannot avoid or filter or effectively shield EMF. Even with opt out or opt in programs, neighbors and all businesses will still have smart meters. Sensitive persons will have to move, with very, very few affordable practical places to go, and will be denied access to businesses and offices for employment purposes, access to medical care, shopping and everything else. An analogy would be to blanket the earth with peanut dust; a certain percentage of people would become and remain very ill, or worse.

**Q. What do many Electronic Engineers say about smart meters?**

**A. Many electronic engineers and the politicians and utilities that listen to them are of the opinion that the levels of EMF emitted by smart meters are so tiny they cannot possibly have any effect on humans. They firmly believe this because:**

- 1) these levels are below the thermal "safety" limit the FCC has set,
- 2) they consider the results of research on non-thermal effects very controversial,
- 3) they erroneously believe that one cannot accept research results until one can prove or at least imagine a mechanism first,



1       4) since they are experts in electronics, they unconsciously assume that their expertise  
2       carries over into being able to make judgements about possible effects of EMF on  
3       humans, and

4       5) they are not aware that they have experienced any effects themselves.

5       I respond with realities:

6       1) The FCC limit is not biologically relevant since it is only a thermal limit, i.e. the limit  
7       before appreciable bulk heating of meat begins, and it is a time average which does not  
8       factor in biologically important frequencies or the biologically relevant peak power. In a  
9       letter written by Norbert Hankin of the US EPA Center for Science and Risk Assessment,  
10      Radiation Protection Division (see attached Exhibit F, incorporated herein by reference)  
11      he said "*the generalization by many that the ( current FCC) guidelines protect human*  
12      *beings from harm by any or all mechanisms is not justified.*"

13      2) Most engineers don't have enough knowledge of molecular biology to realize that  
14      many possible high-gain mechanisms do exist that could account for non-thermal effects.

15      3) There are many hundreds of research papers showing non-thermal effects, but funding  
16      to confirm the results or to do more research in this direction has dried up. Industry has  
17      flooded the journals with research and review articles that are very heavily biased in the  
18      opposite direction. I discuss this further in my attached Exhibit C, incorporated herein by  
19      reference.

20      Therefore, discussions based on FCC limits, engineering opinions, beliefs or research  
21      results are as unproductive as arguing over interpretations of the Bible; and none of the  
22      above is very useful to us at the present time. What we do have in the Survey is real-  
23      world solid evidence that real people have actually been injured and continue to be  
24      injured by smart meters, in spite of the opinions of engineers.

Where did the highly erroneous concept originate that you need to prove a mechanism (or even need to be able to imagine a mechanism) before accepting data?

This is the exact opposite of the creative scientific attitude that can result in breakthroughs. Many people are afraid of breakthroughs; they rock the boat and the vested interests. Wherever it began, this false concept has of course has been taken up by industry and government as a battle cry, then parroted by the media, and now everyone believes it, even most "scientists".

**Q. Based on your studies, your work with EHS sufferers and your survey results, what are your opinions on the question of whether smart meters are safe or "unsafe"?**

**A. What does it take for smart meters to be considered unsafe? What % of the persons who have smart meters on their residences, or what actual number of persons, would have to be shown to have been harmed with certainty by smart meters? 0.1%? 1.0%? 5%? 10%?; 1,000 persons? 10,000 persons? 100,000?**

**What constitutes a threat of harm to the health of normal persons? If 1% of normal persons are made ill from smart meters, this means that if a normal person has a smart meter installed on their home, there is a 1% probability of harm. Would this not be a threat?**

**If a government agency or a corporation was forcing the deployment of technology on citizens that was known in advance to cause disability or significant harm to one out of every 100 citizens, would this amount of harm be "acceptable" or would it be cause to halt such deployment? What would the probability of harm have to be to be prevent deployment? The actual acceptable limit chosen would probably be proportional to the perceived degree of necessity of the particular technology. Most technology is not**